SUBJECT:	FERMI RESEARCH ALLIANCE PROCEDURES PROJECT MANAGEMENT	NUMBER:	12.PM-007
RESPONSIBILITY:	Office of Project Support Services	REVISION:	5
APPROVED BY:	Head, Office of Project Support Services	EFFECTIVE:	11/19/14
TITLE	Change Control		

1.0 PURPOSE

This procedure describes the change control process for projects, including those managed under the *FRA Earned Value Management System*. The change control procedure is the documentation of changes to a project's Performance Measurement Baseline (PMB), including scope, budget, and/or schedule. Changes are controlled to maintain the integrity of the baseline. Changes shall not be authorized to mask cost or schedule variances that can be corrected by management attention or action.

2.0 SCOPE

This procedure applies to all work at all levels of the project Work Breakdown Structure (WBS). The baseline change management process is applicable from the initiation of a Baseline Change Request (BCR) form, to the approval process including incorporation of the change (if approved) into the project PMB and all associated technical baseline documents. This procedure also applies to the change control process for new work as directed by the customer.

Any project participant may initiate a change. Generally, the participant that is affected directly by the change is responsible for initiating the change. In any case, the Control Account Manager (CAM) is responsible for reviewing and for ensuring appropriate documentation is prepared to substantiate the change, including documenting proposed alterations to the currently approved project baseline scope, schedule, and/or budget. Project Controls support the CAM by helping to determine the schedule and budget impact of and validating BCRs.

The Project Manager ensures that the change control process is used proactively and is not a reactive mechanism. Requested changes to the project baseline to eliminate poor project performance issues and/or mitigate baseline variances are not appropriate. Baseline changes designed to eliminate variances at the beginning of a fiscal year are also not appropriate. For any BCRs not approved, no baseline adjustments are made, but an entry in the change control log is maintained. The project will continue to work to, measure, and report progress against the approved baseline until any BCR is approved and the baseline changes are incorporated.

The impact of a pending BCR can only be fully assessed with a cross-functional evaluation conducted by the Project Manager. The Change Control Board (CCB) as specified in the Project Management Plan (PMP), ensures the cross-functional needs are evaluated by reviewing all BCRs. The CCB evaluates the necessity, merits, and impact of changes. The CCB ensures technical performance, scope, cost, schedule, and associated risk impacts are understood and documented. CCB membership typically consists of key members of the project management team, including level 2 managers, the ES&H officer, the QA manager, the Project Controls Manager/Lead, and others as appropriate. The Project Controls Manager/Lead will ensure that all changes are consistent with the EVMS processes. The Project Technical Board or the Project Management Group may

also serve as the Change Control Board provided that these groups include the necessary membership.

The specific composition, duties, and responsibilities of the CCB will be included in each project's PMP.

3.0 RESPONSIBILITIES

3.1 Customer is responsible for

- Reviewing, approving, and disapproving BCRs in accordance with the PEP

3.2 Project Manager (PM) is responsible for

- Identifying potential changes
- Reviewing, approving, and disapproving BCRs
- Differentiating BCRs that should be processed from updates to Estimates to Complete/Estimates at Completion (ETC/EAC) that are more accurately characterized as variances
- Notifying Control Account Managers of any changes which could affect their control accounts

3.3 Change Control Board

- Identifying potential changes
- Ensuring cross-functional needs of the project are evaluated
- Evaluating the necessity, merits, and impacts of BCRs
- Ensuring technical performance, scope, schedule, and risks are evaluated

3.4 Control Account Manager (CAM) is responsible for

- Identifying potential changes
- Preparing BCRs in conjunction with Project Controls
- Reviewing, approving, and disapproving applicable CRs
- Submitting BCRs to Project Manager

3.5 Project Controls is responsible for

- Helping determine impact of and validating BCRs
- Recording approval/disapproval and implementation of BCRs
- Incorporating approved changes into the PMB
- Ensuring that all changes are consistent with the EVMS processes

3.6 Project Financial Analyst is responsible for

- Helping determine impact of and validating BCRs
- Updating Statements of Work and corresponding purchase orders/contracts with non-FRA entities when they are impacted by an approved change

4.0 PROCEDURE

Project changes will be classified by thresholds that are documented in the Project Execution Plan (PEP) and PMP. These thresholds are based on an assessment of the impact of the change on the project technical, schedule, and budget elements of the project baseline and are approved by the client. On DOE projects, they are set in conjunction with the DOE Federal Project Director and the Office of Science guidelines. See Appendix C for examples of thresholds at various project values.

Changes to the project's baseline are controlled in a manner that provide traceability and accountability to contract changes, performance measurement baseline replanning, formal rebaseline activities, and baseline maintenance. Types of internal and external baseline changes are discussed in the following sections.

4.1 Internal Replanning and Changes

The project may prepare and implement internal BCRs for review and approval within the limits of the PEP-approved thresholds, as necessary to accommodate budget, schedule, or technical scope changes. The objective of internal replanning is to reflect a more accurate and realistic project plan. These replanning actions may be appropriate to adjust future work due to budget, schedule, and technical problems that:

- have caused the original plan to become unrealistic
- require a reorganization of work or personnel in order to increase the efficiency for accomplishing the effort
- require different engineering or construction approaches

Internal replanning is intended for in-scope changes and replanning of future work. Internal replanning to accommodate adjustments to future work (e.g., project scope evolves, technical approaches change, or resource availability changes) is a normal project management process. The effect is most easily seen in changes to the schedule and budget distribution. All budget changes to the baseline as a result of internal changes are documented in a BCR and follow change control processes as defined in this procedure. Internal changes may be within a single control account or require transfers between control accounts. Typical internal changes include:

- Scope and budget transfers between control accounts
- Changes in make vs. buy decisions requiring replanning
- Changes to the work approach that change the control account scope or the Budget at completion (BAC)
- Contingency and management reserve transfers
- Future rate changes (including Fermilab indirect rate changes) significant (as defined in the PMP) enough to warrant replanning
- Funding revisions that affect resource availability
- Adjusting subcontract budget values to reflect negotiated values
- Adjusting material budgets to reflect modifications to material lists after design phases
- Converting planning packages to work packages
- Changes to Project Organization and/or personnel including Project Management and CAMs.

The following restrictions apply to any type of internal replanning:

- Internal replanning efforts are allowed on open work packages as long as the past portion of the work already completed is not affected, but will require documented Customer approval prior to change. Changes to open WPs will be limited to Customer directed changes or formal reprogramming. Retroactive changes to the previously reported BCWS, BCWP, and ACWP are prohibited, except for the correction of errors. Accounting adjustments must be made in the current period, in accordance with financial accounting procedures.
- Only the future portion, i.e. portion of work to be performed beyond the current performance period, of open work packages may be changed. The start date for any

work package, opened or unopened, can only be changed on future work that has not yet started as of the current performance period.

- Minor modifications to work packages are discouraged and, in most cases, should not be implemented. For example, vendor actual costs that are slightly higher than estimated in the PMB should not be adjusted by change control at the work package level, since slightly lower costs in another work package could balance costs within a control account, thus not requiring any management action.
- The time phasing of the BCWS may be changed in open work packages, as long as the following two conditions apply: (1) the changes only affect future budgets/efforts; and (2) the work packages continue to support key milestones in the schedules after the changes are implemented.
- A budget transfer from one control account to another is prohibited unless the accompanying work is also transferred. This transfer is accomplished by returning the budget to management reserve, and then releasing the management reserve to the control account where the work will be performed.
- An internal change must be approved before a budget revision can be formally incorporated into the performance measurement baseline and its associated work executed. Changes shall not be implemented until the approval process described in the PEP has been completed. Approvals may be obtained by signature or electronic means.
- Internal changes and plans are reviewed to ensure that replanning does not result in the application of budget intended for future work to a near-term effort.

4.2 External/Directed Changes

The project may receive directed changes from sources outside the project. These imposed changes may include funding changes from DOE, policy changes, rate changes, or scope changes. Regardless, such changes must still follow these change control procedures in accordance with the thresholds in the PEP.

The budget for these externally directed changes may be placed into Undistributed Budget if the work is not yet planned. When plans are complete then the budget can be distributed into control accounts.

4.3 Authorized Unpriced Work

During the course of a project, changes may be necessary that should proceed quickly, but for which definite cost is not known at the outset. However, the work still needs to be authorized through a BCR, and the scope and estimated cost captured in the performance measurement baseline. This is accomplished by processing a BCR with the best information available, but not distributing the budget into control accounts. The budget is then moved from management reserve and held in the Undistributed Budget account, with notation that it is to be reserved for that specific scope and BCR. When the cost is completely negotiated and known, a second BCR is processed to move the funds from undistributed budget into the appropriate control accounts.

4.4 Formal Rebaselining

Rebaselining of the project may be required when both project management and the customer recognize that the existing baseline is not useful to manage the project.

The mechanics of implementing a rebaseline action depend on the desired outcome. For instance, if the desired outcome is a PMB that serves as a more effective indicator, then

previous cost variances might be eliminated. If a more realistic schedule is the principal objective, the previously reported schedule variances would be eliminated. If both the budget and schedule baseline were decidedly insufficient to serve as a useful management tools, both cost and schedule variances (to date) would be eliminated.

The three potential methods for implementing a rebaseline action include:

1. Elimination of schedule variance:
   In this method, for affected control accounts, the time-phased budget (BCWS) is set equal to the earned value (BCWP) to date. This method would be selected if the budgetary element of the baseline is still valid while the schedule element is decidedly unrealistic or unachievable. Remaining BCWS would then be spread over the forecasted completion dates.

2. Elimination of cost variance:
   In this method, the affected control account earned value (BCWP) is set equal to the project actual cost (ACWP) and the schedule variance is maintained by adjusting the BCWS by the difference between the earned value (BCWP) and the time phased budget.(BCWS). This method might be selected if the reason for the rebaseline is that the existing budget baseline was decidedly insufficient to serve as a meaningful management tool. The future portion of the PMB would be established based on a thorough re-estimate of the anticipated costs to complete the project (ETC). To the extent that the new EAC exceeds the previous Contract Budget Base (CBB), a revised baseline budget must be approved through the change control process.

3. Elimination of both schedule and cost variances:
   In this method, both BCWS and BCWP are set equal to actual cost (ACWP), with the new approved EAC spread over a realistic schedule for all remaining work. This method would be selected where both the remaining budget and schedule parameters no longer serve as a meaningful baseline against which to measure and report performance.

Regardless of which rebaseline method is used, all rebaseline efforts are coordinated with the Customer and must be dispositioned through the project change control process before a new baseline is established. Under no circumstances is a project rebaseline initiated to mask variances that can be corrected by management action and/or attention.

4.5 Administrative Change

Those changes to the PMB that do not result in a technical, budget, or schedule change are administrative changes. Code fields that are under configuration control, such as Activity Codes and Resource Codes, can only be changed via an Administrative BCR. The Project Controls Lead will approve any Administrative BCR, with acknowledgement of the CAM. The P6 and Cobra Administrators will process the change when the Administrative BCR has been approved and documented in the BCR Log. The following are Activity Codes that require an Administrative BCR in order for them to be changed in the PMB: WBS, Control Account, Control Account Manager, Funding Type.

4.6 Change Control Procedure Steps

The sequence of activities involved in this procedure is illustrated in Appendix F. The sequential action steps of the process are described below.

4.6.1 Baseline Change Request (BCR) Initiation

Baseline Change Request:
When a Control Account Manager (CAM) or his designee observes or is presented with a potential scope, schedule, or budget change the CAM will notify the Project Manager. The CAM works with Project Controls to define the impacts of the proposed change. The CAM then submits documentation for a proposed change, using a BCR form (see Appendix D), to the Project Manager. Project Controls staff (or others as designated in the Project Management Plan) maintains the project BCR Log, generates a BCR number and summarizes the schedule and/or budget impact of the proposed change. It may be useful on larger projects to keep BCR information in a database format to facilitate reporting.

Subcontracted Effort:
If a control account includes the oversight of a subcontract (e.g., architect/engineer services, construction effort), the Project Manager may authorize the CAM to process changes to the subcontract using contract change methodology, in addition to the formal BCR process. A log of all subcontract changes will be maintained by the CAM, or their designee, and made available to the Project Manager and Project Controls. The Project Manager and Project Controls will review subcontract changes with the CAM to ensure these changes are consistent with the FRA EVMS change control practices and that the Estimate to Complete (ETC) amount reflects all known changes. This process allows for quick action on issues that need field change approval and would allow contractors to proceed with minimal delay.

Collaborator Effort:
Fermilab projects often include collaborators from other DOE laboratories or from universities. If a control account includes collaborator effort, changes to that work will follow the same change control processes that govern work at Fermilab. Changes to existing Statements of Work, Memoranda of Understanding, and/or purchase orders and contracts may be required.

BCR Package Preparation:
The CAM works with Project Controls to prepare an accurate and complete BCR package. The package contains the documentation necessary to support proposed budget and/or schedule change(s). Each BCR must:

- Show the affected WBS element, the level and complexity of the change.
- Be reviewed for consistency, completeness, correctness, and appropriate routing by Project Controls before submittal for approval.

BCRs may be prepared using standard templates and formats created for the project.

The following elements must be included in a BCR package:

Reason/Justification:
The driver of change falls into one or more of the following categories:

- Scope Change: This is an addition, deletion, or transfer of work scope to/from a body of formally authorized work represented in one or more

control accounts. These occur as external, contract-level changes, or internal, Control Account level changes.

- Budget Change: The budget of a given element of authorized work is newly estimated to be different than the budget originally associated with that work. This may result from such things as commodity pricing changes or unexpected results from fixed price bidding. In such case, there have been no changes in requirements or objectives of the work. Typically, there are no activities added to or deleted from the project schedule.
- Schedule Change: Project priorities or unforeseen events may result in re-sequencing of project activities causing a change in the timing and/or definition of controlled or earned value milestones.

Consequence of Not Approving:
The CAM shall include an impact assessment on the BCR form explaining the consequence of not approving the BCR.

Budget Impact:
The Project Manager, with the assistance of Project Controls, shall attach a cost impact statement to the BCR package when budget is requested, returned, and/or transferred. This statement shows the financial impact of the proposed change by control account and work package. This is relevant when contingency and/or management reserve is requested/returned or when budget (and scope) is transferred from one control account to another. This information shall be reflected on the BCR form and entered in the Baseline Change Control log when a log number is obtained. When scope is moved between control accounts or in the schedule, the corresponding budget will accompany it, resulting in a scope and budget transfer.

The before and after budget impact by control account, shall be shown on an attachment and made part of the BCR record file. Also on the CR form, a breakdown of the budget impact by control account shall be listed.

Schedule/Contract Milestone Impact Statement:
The Project Manager, with the assistance of Project Controls, shall provide a copy of the schedule to reflect the milestones that are affected if the BCR requires a milestone revision.

Proposed schedule revisions shall be indicated in attached schedule copies provided by Project Controls to reflect the pending milestone and date changes with "before" and "after" versions. These will be entered into baseline schedule if/when the action is approved.

Contingency and Management Reserve:
The Project Manager, with support from Project Controls, shall indicate if the impact of the change will result in a request for expenditure of project contingency or project management reserve. Rules/thresholds for the use of contingency and management reserve are defined in the Project Execution

Plan (PEP) and the Project Management Plan (PMP). Budget can be transferred from or returned to the contingency budget as the result of a change.

WBS Affected:
The CAM shall indicate the Work Breakdown Structure (WBS) elements affected as a result of the change. If the change will impact other control accounts, the CAM shall notify the other affected CAMs to insure all issues are brought forward prior to approval of the change.

4.6.2 BCR Timing

All changes to the baseline, with exception of rate changes and projects without an established PMB, must happen in the future and cannot change past or present data. For example, using a calendar month cycle, if today's date is June 25th, 2014 all time prior to June 1, 2014 is past, June 1 to June 30, 2014 is present, and all time after June 30 (starts July 1) is future. In this example, change control must be implemented after the current period i.e. July 1 or later. All documentation, approvals, and system tool products (P6 & Cobra data) must be enacted in future periods regardless of P6 or Cobra file or data dates.

Three exceptions are given latitude to enact changes in the current period: Rate changes, obvious errors such as typographical mistakes, and projects without an established PMB. However, these exceptions must not change prior periods or history. This latitude is necessary for rate changes because the potentially large actual adjustments made by accounting will occur in the current period. These adjustments may cause large swings resulting in false or exaggerated variances. To offset the actual adjustments, it may be necessary to compensate with BCWS changes within the same time-period; otherwise adjustments in future periods would result in more false or exaggerated variances. Latitude is also given to projects that have not established or are establishing the PMB. These projects maybe using a graded approach to EVM or may need more time for change control, variance analysis, and other EVM tools prior to establishment of the PMB.

4.6.3 Disposition of BCR

Project Controls processes the BCR for signature from the CAM, through Project Controls, then submits the BCR to the Project Manager. If required, signatures above the PM will be obtained by him/her. The BCR can be approved, approved with changes, disapproved, or returned for revisions.

Approval/Disapproval Processed:
Once a BCR is either approved or disapproved, the BCR log shall be updated by the Project Controls and electronically filed, with a copy to the Project Manager. The minimum content for a BCR log is shown in Appendix E. Notice is sent to the CAMs and other project team members informing them of the change to the baseline.

Work Authorization:
Pending issuance of the updated Work Authorization Document, work is authorized to proceed upon approval of the BCR. The date for this authorization is the date logged as the approved date in the BCR Log.

PMB Updates:
The CAM must work with Project Controls to update all affected CAP and Project documents that reflect scope, schedule, and budget information and assure that these updates are consistent with the approved BCR. This must be accomplished in a timely manner, typically within 30 days, and preferably within the same reporting period. Included in the documents to be updated are Work Authorization Forms and supporting documents.

4.6.4 Documents and Records

Certain project documents are considered "Controlled Documents" in order to protect the integrity of the PMB and budget base, and to ensure that all project participants are aware of the latest official versions. The process by which each project will manage the documents will be detailed in the project's Configuration Management Plan.

In general, changes to these controlled documents will be formally approved by the Project Manager, signed and dated, and the description of the change recorded. The revision log in each document will be used for this purpose. Controlled documents will be reissued to project participants and selected stakeholders within 30-days of an authorized change. When reissue of revised documents is accomplished by posting to an approved project web site, participants will be informed of the change. Controlled documents for EVMS purposes are, as a minimum: the PEP and its component sections, to include the baseline scope, schedule, performance measurement baseline, WBS (to include the listing of all control accounts and associated budgets), WBS Dictionary, Work Authorization Form, and key milestones.

Documents and records generated as a result of implementing this procedure shall be generated in a manner suitable for reproduction and shall be signed and dated at the time of completion. The Project Manager or designee shall retain the official, signed electronic BCR documents.

5.0 REFERENCES

DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*
FRA *Earned Value Management System Program Description*

EVMS Procedure 12.PM-001 *Project WBS, OBS, RAM*
EVMS Procedure 12.PM-002 *Control Accounts, Work Packages, Planning Packages*
EVMS Procedure 12.PM-003 *Work Authorization*
EVMS Procedure 12.PM-004 *Project Scheduling*
EVMS Procedure 12.PM-005 *Project Cost Estimating*
EVMS Procedure 12.PM-006 *Monthly Status and Reporting*

6.0 APPENDICES

12.PM-007A: Appendix A: Signature Page and Revision History
12.PM-007B: Appendix B: Acronyms and Glossary
12.PM-007C: Appendix C: Examples of Change Control Thresholds at Various Project Values
12.PM-007D: Appendix D: BCR Form
12.PM-007E: Appendix E: BCR Log
12.PM-007F: Appendix F: BCR Flowchart

Appendix A
SIGNATURE PAGE AND REVISION HISTORY

This procedure approved by: Marc Kaducak 11/20/2014
Marc Kaducak **DATE**
Head, Office of Project Support Services
Fermi National Accelerator Laboratory

TABLE OF REVISIONS

Author(s)	Description	Revision	Date
	Initial Version	0	10/17/08
E. McCluskey	Removed reference to funding In Appendix B added acronym CA and changed definition of Control Account and changed definition for Control Account Manager.	1	12/02/08
E. McCluskey	Revised lexicon to "contingency /management reserve; clarified WAD revision requirement	2	3/27/2009
E McCluskey	In 4.4.2, added notice to be sent after CRs are approved. Revised language throughout to reflect changes to MR/contingency. Revised sample form to show MR or contingency selection and cost impact by control account.	3	09/17/09
M. Kaducak	In section 4.1, added detail on timing of internal replanning and change implementation. In section 4.5, updated usage of contingency and management reserve terminology. Updated DOE O 413.3A to DOE O 413.3B in References. Changed OPMO to OPSS. Added detail on definition of future work. Added section 3.5. Updated form in Appendix D.	4	08/18/13
R Marcum	Revised all sections to reflect changing Change Request or CR to Baseline Change Request or BCR for consistency. Added responsibilities of Change Control Board to sections 2.0 and 3.3. Added responsibility of PM to notify CAM of changes in section 3.2. Added clarification of Administrative changes 4.5 Added clarification to not make	5	11/19/14

	changes in current time period in 4.6.2 Added clarification regarding Work Authorization of changes 4.6.3		

Appendix B
ABBREVIATIONS, ACRONYMS, AND GLOSSARY OF TERMS

ACWP — Actual Cost of Work Performed
AE — Acquisition Executive
ANSI — American National Standards Institute
BAC — Budget at Completion
BCR – Baseline Change Request
BCWP — Budgeted Cost of Work Performed
BCWS — Budgeted Cost of Work Scheduled
CA — Control Account
CAM — Control Account Manager
CAP — Control Account Plan
CBB — Contract Budget Baseline
CCB – Change Control Board
CD — Critical Decision
CV – Cost Variance
DOE — U.S. Department of Energy
EAC — Estimate at Completion
ES&H — Environmental Safety & Health
ETC — Estimate to Complete
EVMS — Earned Value Management System
FRA — Fermilab Research Association
KPP – Key Performance Parameters
PB — Performance Baseline
PEP — Project Execution Plan
PMB — Performance Measurement Baseline
SOW — Statement of Work
SV — Schedule Variance
TEC — Total Estimated Cost
TPC — Total Project Cost
WBS — Work Breakdown Structure

Acquisition Executive (AE) - The individual designated by the Secretary of Energy to integrate and unify the management system for a program portfolio of projects, and implement prescribed policies and practices.

Authorized Unpriced Work - Any change to the contract statement of work that has been authorized by the customer and is being worked on, but for which no price has yet been negotiated.

Budget at Completion (BAC) - The total authorized budget for accomplishing the scope of work. It is equal to the sum of all allocated budgets plus any undistributed budget. (contingency is not included.) The Budget at Completion will form the Performance Baseline.

Budgeting - The process of translating resource requirements into a funding profile.

Baseline Change Request – The documentation that describes a change in scope, cost, or schedule, initiating as a request to the Project Manager, and ultimately resulting in approval or disapproval, with associated appropriate implementation into the PMB.

Change Order - A bilateral or sometimes unilateral order signed by the government contracting officer that directs the contractor to make a change that the change clause authorizes usually with, but sometimes without, the contractor's consent.

Change Control Board – A cross-functional committee, advisory to the PM regarding approval of BCRs whose membership is defined in the Project Management Plan.

Conceptual Design - The concept for meeting a mission need. The conceptual design process requires a mission need as an input. Concepts for meeting the need are explored and alternatives considered to determine a set of alternatives that are technically viable, affordable, and sustainable.

Configuration Management – The control, documentation, and reporting of changes to data sets, technical specifications, reports, and documents.

Contingency - The budget identified by the customer and the project, for managing unknown risks. The release of this budget is managed through the change control process and determined by approval thresholds defined in the PEP and PMP. Contingency is different from management reserve, and is not part of the Performance Measurement Baseline.

Contract - A contract is a mutually binding agreement that obligates the seller to provide the specified product and obligates the buyer to pay for it.

Contractor - An individual, partnership, company, corporation, or association having a contract with a contracting agency for the design, development, maintenance, modification, or supply of deliverable items and/or services under the terms of a contract.

Control Account (CA) - A key management control point located at the natural intersection point of the WBS and the OBS, where functional responsibility for work is assigned. It represents the point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes.

Control Account Manager (CAM) – The member of the project team responsible for the performance defined in a Control Account and for managing the resources authorized to accomplish the tasks.

Cost Estimate - A documented statement of costs estimated to be incurred to complete the project or a defined portion of the project.

Cost Variance - The difference between Earned Value and Actual Cost (Cost Variance = Earned Value – Actual Cost.) A positive value indicates a favorable condition, and a negative value indicates an unfavorable condition.

Cost Performance Index (CPI) - The ratio of earned value to actual costs (BCWP/ACWP); a value greater than one denotes favorable performance. CPI is often used to predict the magnitude of possible cost deviations from the baseline.

Critical Decision (CD) - On DOE projects, a formal determination made by the Acquisition Executive and/or designated official at a specific point in a project life cycle that allows the project to proceed. Critical Decisions occur in the course of a project: at determination of Mission Need (CD-0), at the completion of conceptual design (CD-1), at project baselining (CD-2), at the commencement of execution (CD-3), and at turnover (CD-4).

Deviation - A deviation occurs when the current estimate of a performance, technical, scope, schedule, or cost parameter is not within the threshold values of the Performance Baseline for that parameter. It is handled as a deviation, not through the normal change control process.

Directed Change - A change imposed on a project(s) that affects the project's baseline. Example of directed changes include, but are not limited to, (1) changes to approved budgets or funding and (2) changes resulting from DOE policy directives and regulatory or statutory requirements.

Duration - The number of work periods (not including holidays or other nonworking periods) required to complete an activity or other project element, and usually expressed as workdays or workweeks.

Estimate at Completion (EAC) - The latest revised cost estimate for a given work scope.

Estimate to Complete (ETC) - Estimate of costs to complete all work from a point in time to the end of the project.

Management Reserve - The portion of the project budget allocated by the customer and under the authority of the project for management control purposes rather than being designated for the accomplishment of specific tasks. The customer will determine whether it will be used on each project and, if so, its purpose may also be pre-defined by the customer. It is not part of the Performance Measurement Baseline (PMB). The release of this budget is managed as part of the total contingency through the change control process and determined by approval thresholds defined in the PEP and PMP.

Milestone - A scheduled event marking the due date for accomplishment of a specified effort (work scope) or objective. A milestone may mark the start, an interim step, or the end of one or more activities.

Performance Measurement Baseline (PMB) - The collected key performance, scope, cost, and schedule parameters. The Performance Measurement Baseline defines the threshold and boundary conditions for a project.

Program Office - The DOE headquarters organizational element responsible for managing a program.

Project - In general, a unique effort that supports a program mission; has defined start and end points; is undertaken to create a product, facility, or system; and contains interdependent activities planned to meet a common objective or mission. A project is not constrained to any specific element of the budget structure (e.g., operating expense or plant and capital equipment). Construction, if required, is part of the total project. Projects include planning and execution of construction, renovation, modification, environmental restoration, decontamination and decommissioning efforts, and large capital equipment or technology development activities. Tasks that do not include the above elements, such as basic research, grants, ordinary repairs, maintenance of facilities, and operations, are not considered projects.

Project Controls – Project support staff for planning, baseline development, management system plan preparation, as well as for monitoring, assessing, controlling, and reporting progress against the project baseline.

Project Execution Plan (PEP) - The plan for the execution of the project, which establishes roles and responsibilities and defines how the project will be executed. Every project implementing Earned Value management will have a unique project execution plan.

Project Financial staff – Project support staff for preparing cost information for monthly reports, monitoring expenditures, tracking spending deviations from baseline plans, preparing the Project Accounting task structure, tracking requisitions, and developing interfaces for financial information from external entities such as other laboratories and universities.

Remaining Duration - The time needed to complete an activity.

Risk - A measure of the potential inability to achieve overall project objectives within defined cost, schedule, and technical constraints, and has two components: (1) the probability/likelihood of failing to achieve a particular outcome, and (2) the consequences/impacts of failing to achieve that outcome.

Risk Management - The act or practice of controlling risk. An organized process that reduces risk, prevents a risk from happening, or mitigates the impact if it does occur.

Schedule - A plan that defines when specified work is to be done to accomplish program objectives on time.

Schedule Control - Controlling changes to the project schedule and preparing workaround plans to mitigate the impact of adverse results/delays by others.

Schedule Performance Index (SPI) - A schedule performance indicator relating work accomplished to the planned schedule (BCWP/BCWS). A value greater than one denotes favorable performance.

Schedule Variance (SV) - A metric for the schedule performance on a program. It is the algebraic difference between Earned Value and the Budget (Schedule Variance = BCWP – BCWS). A positive value is a favorable condition while a negative value is unfavorable. The SV is calculated in dollars or work units, and is intended to complement network analysis, not to supersede or replace it.

Statement of Work (SOW) - The document that defines the work-scope requirements for a project. It is a basic element of control used in the processes of work assignment (scope) and the establishment of project schedules and budgets.

System - A collection of interdependent equipment and procedures assembled and integrated to perform a well-defined purpose. It is an assembly of procedures, processes, methods, routines, or techniques united by some form of regulated interaction to form an organized whole.

Total Estimated Cost (TEC) - The Total Estimated Cost of a project is the specific cost of the project, whether funded as an operating expense or construction. It includes the cost of land and land rights; engineering, design, and inspection costs; direct and indirect construction costs; and the cost of initial equipment necessary to place the plant or installation in operation, whether funded as an operating expense or construction.

Total Project Cost (TPC) - Total cost for the project, including all costs regardless of sources or type of funds.

Undistributed Budget (UB) - Budget associated with specific work scope or contract changes that have not been assigned to a control account.

Work Breakdown Structure (WBS) - A product-oriented grouping of project elements that organizes and defines the total scope of the project. The WBS is a multilevel framework that organizes and graphically displays elements representing work to be accomplished in logical relationships. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services. It is the structure and code that integrates and relates all project work (technical, schedule, and cost) and is used throughout the life cycle of a project to identify and track specific work scopes.

Work Breakdown Structure Dictionary - A listing of work breakdown structure elements with a short description of the work-scope content in each element.

Work Package - A task or set of tasks performed within a control account. The work package is the lowest level activity to which resources are assigned.

Appendix C
Examples of Change Control Thresholds at Various Project Values

Example C1: Change Control Thresholds for Major System Projects, TPC ≥ $750M

	Acquisition Executive (Level 0)	Associate Director OHEP (Level 1)	DOE Federal Project Director (Level 2)	Fermilab Associate Director (Level 3)	Fermilab Project Manager (Level 4)	Subproject Manager (Level 5)
Scope	A change in scope that affects the ability to meet a KPP and the ability to satisfy the mission need.	Any change in the KPPs as referenced in PEP.	Any significant change to the technical scope (as described in PEP) that affect ES&H requirements or meeting Project Closeout definitions stated in PEP.	Major technical changes that are significant departures from the technical baseline. Changes that affect ES&H. Out-of-scope changes to upgrade physics capabilities.	Related technical changes to multiple subprojects that do not diminish performance	Minor technical changes to a single subproject that does not diminish performance
Schedule	> 6 month (cumulative) delay in the CD-4 project completion date.	Any change to a level 1 milestone > 3 months, or up to a 3 month delay in CD-4 project completion date.	Any change to a Level 2 milestone > 1 month or a Level 1 milestone < 3 months.	Any change that results in the delay of a Level 3 Director's milestone.	Any change that results in the delay of a Level 4 milestone by more than one month.	Any change that results in the delay of a Level 5 milestone by more than one month
Cost	Any increase in excess of the lesser of $25M or 25% (cumulative) of the CD-2 Total Project Cost baseline.	Any change in Total Estimated Cost or Total Project Cost. The smaller cumulative change of greater than $50M or 50% to each level 2 WBS cost	Any cumulative use of management reserve or contingency of > $10M or 50% to each level 2 WBS cost.	Increase in the cost of a single item by more than $2.5M. Increase in the Project base cost exceeding $5M during the previous 12 months.	Increase in the cost of a single item by more than $500k.	Increase in the cost of a single item by more than $100k.

Example C2: Change Control Thresholds for Non-Major System Projects, $400M ≤ TPC < $750M

	Acquisition Executive (Level 0)	Associate Director OHEP (Level 1)	DOE Federal Project Director (Level 2)	Fermilab Associate Director (Level 3)	Fermilab Project Manager (Level 4)	Subproject Manager (Level 5)
Scope	A change in scope that affects the ability to meet a KPP and the ability to satisfy the mission need.	Any change in the KPPs as referenced in PEP.	Any significant change to the technical scope (as described in PEP) that affect ES&H requirements or meeting Project Closeout definitions in PEP.	Major technical changes that are significant departures from the technical baseline. Changes that affect ES&H. Out-of-scope changes to upgrade physics capabilities.	Related technical changes to multiple subprojects that do not diminish performance	Minor technical changes to a single subproject that does not diminish performance
Schedule	a 3 to 6 month (cumulative) delay in the CD-4 project completion date.	Any change to a level 1 milestone > 3 months, or up to a 3 month delay in CD-4 project completion date .	Any change to a Level 2 milestone > 1 month or a Level 1 milestone < 3 months.	Any change that results in the delay of a Level 3 Director's milestone.	Any change that results in the delay of a Level 4 milestone by more than one month.	Any change that results in the delay of a Level 5 milestone by more than one month
Cost	Any increase in excess of the lesser of $25M or 25% (cumulative) of the CD-2 Total Project Cost baseline.	Any change in Total Estimated Cost or Total Project Cost. The smaller cumulative change of greater than $50M or 50% to each level 2 WBS cost	Any cumulative use of contingency of > $10M or 50% to each level 2 WBS cost.	Increase in the cost of a single item by more than $2.5M. Increase in the Project base cost exceeding $5M during the previous 12 months.	Increase in the cost of a single item by more than $500k.	Increase in the cost of a single item by more than $100k.

Example C3: Change Control Thresholds for Projects, $100M ≤ TPC < $400M

	Acquisition Executive (Level 0)	Associate Director OHEP (Level 1)	DOE Federal Project Director (Level 2)	Fermilab Associate Director (Level 3)	Fermilab Project Manager (Level 4)	Subproject Manager (Level 5)
Scope	A change in scope that affects the ability to meet a KPP and the ability to satisfy the mission need.	Any change in the KPPs as referenced in PEP.	Any significant change to the technical scope (as described in PEP) that affect ES&H requirements or meeting Project Closeout definitions in PEP.	Major technical changes that are significant departures from the technical baseline. Changes that affect ES&H or impact PoT projections by more than 10%. Out-of-scope changes to upgrade physics capabilities.	Related technical changes to multiple subprojects that do not diminish performance	Minor technical changes to a single subproject that does not diminish performance
Schedule	a 3 to 6 month (cumulative) delay in the CD-4 project completion date.	Any change to a level 1 milestone > 3 months, or up to a 3 month delay in CD-4 project completion date .	Any change to a Level 2 milestone > 1 month or a Level 1 milestone < 3 months.	Any change that results in the delay of a Level 3 Director's milestone.	Any change that results in the delay of a Level 4 milestone by more than one month.	Any change that results in the delay of a Level 5 milestone by more than one month
Cost	Any increase in the CD-2 Total Project Cost baseline.	Any change in Total Estimated Cost or Total Project Cost.	Any cumulative use of management reserve or contingency of > $1M.	Increase in the cost of a single item by more than $250k. Increase in the Project base cost exceeding $500k during the previous 12 months.	Increase in the cost of a single item by more than $100k.	Increase in the cost of a single item by more than $25k.

Example C4: Change Control Thresholds for Projects, TPC < $100M

	Associate Director OHEP (Level 1)	DOE Federal Project Director (Level 2)	Fermilab Associate Director (Level 3)	Fermilab Project Manager (Level 4)	Subproject Manager (Level 5)
Scope	Any change in the KPPs as referenced in PEP.	Any significant change to the technical scope (as described in PEP) that affect ES&H requirements or meeting Project Closeout definitions in PEP.	Major technical changes that are significant departures from the technical baseline. Changes that affect ES&H. Out-of-scope changes to upgrade physics capabilities.	Related technical changes to multiple subprojects that do not diminish performance	Minor technical changes to a single subproject that does not diminish performance
Schedule	Any change that causes a delay in CD-4 project completion date .	Any change to a Level 2 milestone > 1 month or a Level 1 milestone < 3 months.	Any change that results in the delay of a Level 3 Director's milestone.	Any change that results in the delay of a Level 4 milestone by more than one month.	Any change that results in the delay of a Level 5 milestone by more than one month
Cost	Any change in Total Estimated Cost or Total Project Cost.	Any cumulative use of management reserve or contingency of > $1M.	Increase in the cost of a single item by more than $250k. Increase in the Project base cost exceeding $500k during the previous 12 months.	Increase in the cost of a single item by more than $100k.	Increase in the cost of a single item by more than $25k.

Appendix D - Sample Baseline Change Request Form

Mu2e Change Request

Mu2e CR Num: 3 Date submitted: 8/20/2014 Change Level: 4

Requestor: Frances Leavell Request Status: Approved

Change_type:

Cost

WBS: 475

WBS Description: Mu2e Project

Approvals: CCB OK:

Ron Ray 8/29/14

Project manager Date Approved

Supporting Documents:

4470

L2 Subprojects:

All

Description: Routine rate adjustments were made in July 2014 by Finance to more accurately reflect labor fringe and DSC overhead rates. The new rates were applied to the project resources. Cost impact: net decrease of $21,549.86.

Justification: Implementing the new rates provides up-to-date pricing of resources.

Cost Impacts:

Estimate type	Cost type	Labor resource type	Before amount	After amount	Cost units
Final	M&S	none	107,025,671	106,434,256	dollars
Final	Labor	various	110,808,408	111,378,273	dollars

Schedule Impacts:

Task Description	Before			After			Duration units
	Start	End	Duration	Start	End	Duration	
none							

Technical Impact: None

Risk Impact: None

Appendix E
Sample Baseline Change Request Log

CR#	WBS	Description of Change	Date	Level	Cost Impact	Schedule Impact	From Contingency or Mang Res Funds	Approval Status
001								
002								
003								
004								
005								
		Total Cost of Changes			0			

Original Baseline Management Reserve	0
Changes	0
Remaining Management Reserve	0
Original Baseline Contingency	0
Changes	0
Remaining Contingency	0

Appendix F
Change Control Flowchart